Mechanisms to foster Self-Determination on Engagement Platforms - An Online Experiment

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Abstract

Engagement platforms (EPs) are an essential technology to enable the sharing and exchanging of services and resources. As an increasing number of industries has been disrupted by EPs, both scholars and practitioners seek understanding on how to design and govern successful EPs. While the initial focus of platform operators was mainly on profit maximization, the interest in securing or increasing user well-being is constantly growing. Design mechanisms that positively influence the three constructs of Self-Determination Theory, autonomy, competence, and relatedness, and thus well-being, have already been identified. In this study we instantiate these mechanisms in a prototype and conduct a scenario-based online experiment with a between-group design to test four hypotheses (n=111). Our results show that autonomy as well as the intention to use increase significantly through mechanisms that foster Self-Determination.

1. Introduction

Digital platforms are changing how products and services are offered and how users derive their value [1]. The rapid advance of digital platforms has already disrupted industries such as retail, entertainment, hospitality and transportation [2, 3].

Given their broad applicability, digital platforms are defined in several ways that can be difficult to distinguish [4]. In this paper we, therefore, focus on the conceptualization of engagement platforms (EPs). Following Breidbach et al. [5, p. 594], we will refer to an EP as a "physical or virtual touchpoint designed to support the exchange and integration of resources structurally, and thus co-creation of value, between actors in a service system". For example, Google has established multiple EPs to manage the customer experience across a vast EP landscape by providing both physical (e.g., Chromebook) and virtual touchpoints (e.g., Google Play Store) [6].

Successful EPs use different mechanisms to attract and engage new users and increase user retention [7]. As users only use a limited number of EPs, competing services will lose market share thus creating 'winner takes all environments' [8]. The use of mechanisms that constantly seek the user's attention can help maximize profits for platform operators, but it can also have a negative impact on the user, e.g., through addictive potential or stress [9, 10].

But recent movements, such as in positive design, are reaching a consensus that the primary focus of technology must be on user benefits and that the ultimate goal should be user well-being [11, 12, 13]. Positive design aims to enhance well-being, defined as "a person's cognitive and affective evaluations of his or her life" [14, p. 63] by designing environments that enable and stimulate human flourishing [11]. Furthermore, it is argued that unique design features that enhance user well-being have yet to be identified [15, 16]. Following self-determination theory (SDT), Peters et al. [12] created a framework based on three key constructs related to well-being: autonomy, competence, and relatedness.

In previous studies, we derived design principles and their respective mechanisms based on the aims: attract and bind actors, achieve mutual growth, foster interaction and value co-creation, and improve competitiveness by coordinated service innovation, through a systematic literature review and expert interviews that could positively impact user self-determination [17, 18, 19]. In total, thirteen mechanisms [18] have been identified to represent activities of EPs to attract users, identify common problems and needs, support co-creation of value, and enable improvement of the user experience to create successful EPs [17]. A design principle is defined as "instantiation of an artifact, through nascent design theory" [20, p.2] and guides the implementation of concrete features. The term mechanisms refers to actions, activities, forms, and processes achieving specific aims [20].

With this research, we aim to evaluate the derived mechanisms using a prototype instantiation.

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Therefore, we instantiate concrete features (e.g. feature: 'contact possibilities of real EP operators' based on the mechanism: *strengthening user trust* to improve the *users' perceived relatedness*) and test them against a prototype with basic functionalities. Hereby, features refer to an instantiation of a mechanism. Based on the two instantiations (basic and manipulated prototype), we conduct a scenario-based online experiment with 111 participants to address the research question:

RQ1: Can specific features increase the perceived self-determination of users on an EP?

Perceived autonomy, competence, and relatedness also influence the intention to use [21], thus providing opportunities for EPs to enhance user retention. Since intention to use is the first step towards continued use, we evaluate this construct as an important variable for EP success [22], as only long-term user interaction ensures EP sustainability. Therefore, we examine whether the implemented features, e.g. 'utilizing feedback channels' to increase perceived autonomy [23], 'providing tutorials' to increase perceived competence [24] and 'ensuring respectful interaction' [25] to increase perceived relatedness, will lead to a higher intention to use the platform. Thus, we ask:

RQ2: Are the implemented features affecting the intention to use the EP?

The remainder of this paper is structured as follows: We provide an overview of the relevant theoretical background on designing engagement platforms and motivational factors. We derive four hypotheses, which are then tested in the framework of our conducted experiment. Finally, we conclude this paper by discussing our research questions against the results, an acknowledgement of limitations and our conclusion.

2. Theoretical background

2.1 Designing engagement platforms

Despite the increased dominance of EPs in many industries and research fields, there is still a lack of understanding on how successful EPs should be designed [17, 26, 27]. However, the need for concrete guidelines that can be provided for the platform operators to create and improve their EPs is presented [27]. The complexity related to designing EPs was recently addressed by various scholars that adopted Design Science Research (DSR) as an approach to propose design principles for EP design, e.g. [28]. Design principles can be used to develop an artefact and since they could be derived, they can also serve as hypotheses for future empirical work [29]. In DSR research, the identified aims of design principles are implemented through mechanisms [20]. To guide the design of EPs, these mechanisms can be used to derive concrete features. Combined, design principles can create a framework, which future EP operators may use to develop successful EPs.

While existing studies focus on easing the entry of actors, value co-creation, and innovation of service and the user experience on digital platforms [26, 30, 31, 32] little attention is paid to factors concerned with user motivation and well-being. Placing high relative importance on intrinsic motivation, defined by "doing of an activity for its inherent satisfaction" [33 p. 56] is positively associated with indicators of well-being such as self-esteem, self-actualization, and the reversal of depression and anxiety [33]. Studies have shown the effect of intrinsic motivation on e.g. games [25, 34] or e-learning, e.g. [21, 35], but so far none have examined their impact on EPs.

2.2 Motivational factors for engagement platforms

Until recently, technologies were designed to improve business metrics, e.g. income, and were focused on increasing user efficiency [36]. However, the long-term, primary goal as e.g. proposed by "positive design", should be to design a EP in such a way that users are intrinsically motivated and, ideally, their well-being is improved [11, 12, 13]. Thereby, the term "positive design" evolved from "positive psychology", which was introduced by Maslow [31] and further popularized by Seligman and Csikszentmihalyi [38]. The term refers to the study of the circumstances and processes that facilitate human flourishing or the optimal functioning of people, groups, and institutions. Positive psychologists concentrate on identifying and determining factors contributing to human well-being. Analogously, "positive design" is concerned with designing environments that enable and or stimulate human flourishing and, therefore, foster well-being [11]. A distinction must be made between objective well-being on the one hand and subjective well-being on the other. Objective well-being describes the extent to which the external conditions for a high quality of life, e.g. nutrition and living environment, are fulfilled. While subjective well-being describes a personal perception about the quality of one's life, and thus is difficult to measure [39].

To advance research on improving subjective well-being related to user experiences as proposed by positive design, Peters et al. [12] created a framework to add value for users by drawing on the constructs of SDT. They describe that the three constructs of autonomy, competence, and relatedness are the most rigorously researched and that these constructs were identified and documented as significant and predictive of intrinsic motivation and thus well-being. SDT was introduced by psychologists Ryan and Deci [33], in which they proposed that human motivation is based on a variety of different emotional needs, as well as internal and external influences. Essentially, the theory focuses on how much an individual's actions, decisions, and behavior are driven by self-motivation and self-determination. “SDT predicts that users will engage with a technology to the extent that interaction with the system satisfies their psychological needs and the primary outcome from need-satisfaction is sustained engagement.”[12, p. 9]

In SDT, competence is characterized by the need to have confidence in one's own abilities, to be able to complete a task or learn specific skills. Feeling competent means the need to know precisely what will happen when a certain action is performed or a decision is made [33]. Competence comes not only from the information and skills learned, but also from personal experience [40]. It was shown that through competence support, e.g. in the form of feedback, the self-perception of competence and also the intrinsic motivation is increased [24]. By including or suggesting features, e.g. ‘tutorials’ and ‘human support’, to help the user navigate and utilize the platform competently, our hypothesis states:

H1a: The manipulated prototype will increase the users’ perceived competence.

Autonomy describes the need for free will. EP users should feel that they are making decisions and taking actions that are consistent with their beliefs and opinions. Hereby, SDT states that mechanisms that provide informative feedback e.g. [23] increase autonomy, whereas threats, deadlines, directives, pressured evaluations, and imposed goals decrease autonomy and thus intrinsic motivation [33]. In learning environments many studies have shown that fostering autonomy through e.g. allowing for a choice in projects or a specific time to do a certain task, increases the intrinsic motivation of students and teachers and has a positive impact on the learning results [41, 42]. By implementing and signaling features that allow the users to make their own informed choices and offer alternatives, such as ‘designing user onboarding processes’ or ‘providing templates to choose from’, we propose that:

H1b: The manipulated prototype will increase the users’ perceived autonomy.

Relatedness is described, e.g. by Baumeister and Leary [43], as the need to feel a sense of belonging and being part of a community. It is about being connected to like-minded people and knowing that one can interact with them in a meaningful way. This includes caring about others and feeling that opinions and thoughts are respected. Sheldon and Filak [25] showed in their experiment, conducted in the game-learning context, that fostering relatedness by emphasizing recognition, caring, and interest in participants' experiences significantly increased intrinsic motivation. By implementing features that e.g. create opportunities for conversational exchange and respectful interaction with each other, we thus propose that:

H1c. The manipulated prototype will increase the users’ perceived relatedness.

These three basic needs: autonomy, competence, and relatedness, also affect long-term engagement [44], and thus can impact the success of an EP. Even though this link is well known, the basic psychological needs are rarely considered in guiding the design of platforms [12]. Yet, it is precisely this shift in focus that could lead to new insights that will shape the design of EPs.

While initial technology adoption is an important first step in realizing its success, the long-term success of a technology depends on its continued use rather than initial use [22]. However, only those companies that prove themselves and can stay in business after the initial hype remain successful in the long term. Intrinsic motivations, in particular, have been shown to be a strong predictor of meaningful user outcomes, such as satisfaction, continuance intentions, and perceived performance [45, 46, 47]. Prior studies, e.g. [21], have already addressed the positive impact of SDT on continuance in the context of e-learning; we now intend to examine the implications for EPs. Therefore, the first question is, whether users really intend to use a technology in the first place.

H2. The manipulated prototype will increase the users’ intention to use.

3. Method

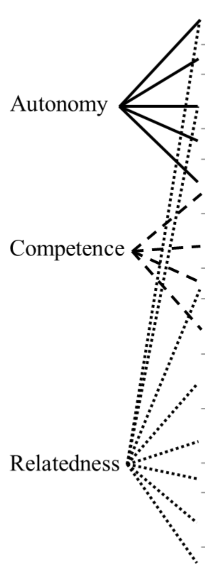
We conducted a scenario-based online experiment to answer our research question and test our four hypotheses. For the context of the scenario, we chose an online neighborhood community. The decision to instantiate an EP that facilitates co-creation in an online neighborhood community stems from several considerations. First of all, P2P sharing contexts have gained vastly in academic and practical interest [6, 48]. Second, digital neighborhood community platforms also inherently highlight both the exchange of products and services involving digital and physical resources [49], thereby serving as an interesting scenario for assessing EPs that specifically foster co-creation in social contexts through physical and virtual touch points [5].

Two versions of an EP prototype were assessed by the participants based on the identical scenarios that included four tasks: a) borrow an object from another user, b) create an offer for items you want to sell, c) report a disrespectful user and d) give the app/community feedback on how to improve their user experience. The configuration of tasks was constructed to include a set of mechanisms we derived through conducting 24 expert interviews with EP operators focusing on processes and features that foster autonomy, competence and relatedness [18] (see figure 1).

3.1 Approach

This research is part of a research project that employs a DSR approach [29]. DSR studies develop design knowledge following iterative design cycles [50]. While several DSR process models, e.g. [50, 51] guide DSR projects, this research is guided by the five-step cycle proposed by Kuechler and Vaishnavi [51] illustrated in table 1.

We follow the DSR approach to ensure that our research as well as the prototype address relevant challenges of businesses and users while building on applicable knowledge derived from academic theories and methods [29]. This combination of practical relevance and scientific rigor guides "exploring by building" in order to understand and design complex information systems, such as EPs [51]. Following the DSR approach we systematically build and evaluate our instantiated artifacts by conducting a systematic literature review [17] on design principles for EPs, expert interviews [19] conducted with 24 EP operators, and online experiments with users [18] to validate the identified mechanisms. This extensive research process yielded a set of 13 mechanisms to foster self-determination on EPs. The mechanisms guide the design of EP with focus on increasing intrinsic motivation to improve the user well-being resulting from the user experience. The features we derived from these mechanisms are illustrated in figure 1.



Mechanism	Implemented features
(1) Treat users as equal partners	Track feedback and participate in user workshops. Allow communities to define individualized rules and messages.
(2) Implement fair cost distributions	Explain the cost distribution transparently and allow first uses free of charge.
(3) Utilize feedback channels	Allow users to rate the platforms to get feedback and transparently display the progress on feedback planned features.
(4) Be open towards new solutions	Signal that the EP allows individualization for specific focus groups.
(5) Support actor onboarding	Provide instructions on how to use the platform and orientate the design on well-known apps to increase familiarity.
(6) Design for usability	Signal that the EP optimizes user workflow based on user experience reports and tries out new features with a small user group first.
(7) Develop new and useful features	Signal that the EP follows up on received feedback and implement user ideas.
(8) Define resource exchange capabilities	Provide clear instructions and rules on how goods and services should be exchanged and adequate channels to do so.
(9) Raise awareness	Allow and encourage users to be purposefully active in relevant social media channels for their own benefit.
(10) Strenghten user trust	Signal human moderation of content and users. Allow only verified users on the platform. Allow users to rate and block other actors.
(11) Attend interpersonal events	Advertise events and meet-ups via the EP to interact with users.
(12) Connect existing and new partners	Provide users with a choice of communication channels and highlight relevant users/user groups to new users.
(13) Convey sustainability	Signal ongoing development and improvement processes transparently.

Figure 1. Mechanisms and implemented features

Table 1. DSR approach based on Kuechler and Vaishnavi [51]

Process steps	Output
Awareness	Literature review, 24 semi-structured expert interviews
Suggestion	Synthesis of design requirements and principles concerned with EP design
Development	Deduction of 13 mechanisms for EP design to increase autonomy, competence, and relatedness. Instantiation of a prototype.
Evaluation	Argumentative, scenario-based online experiment with instantiation
Conclusion	Evaluation by applying the mechanisms to instantiate an EP

3.2 Experiment design

To represent the features in the EP prototypes, we used Figma (an online prototyping tool). We created a basic prototype (BP) of the EP, with the necessary functions to allow users to execute tasks according to the scenario. The BP was then manipulated based on the derived features from the identified mechanisms to promote autonomy, competence and relatedness [18] (see figure 1) (going forward referred to as **c**ompetence-**a**utonomy-**r**elatedness-**p**rototype - CARP). These additional features included e.g., notification about community guidelines and positive examples, additional information about human moderation of content and the origin of costs, user ratings, prompts that suggest sharing the created offer in and outside the app, and information of how users can and have contributed to the development or improvement of the platform. The derived features were integrated into the prototype design as best as possible.

Due to these manipulations, the CARP includes 26 screens that the participants reviewed, while the BP only includes 20 screens. Participants were always presented with all screens of a specific variant and always executed the entire scenario to which they were randomly assigned. Figure 2 depicts screenshots from the CARP. In order to reduce carryover effects, exhaustion and the related risk of response bias that may result from asking users to test both prototypes, a between-group design has been followed. You may review the CARP (https://bit.ly/3jIYtP8) and the BP (https://bit.ly/3yJsLFo) via the respective link (anonymously hosted for review).

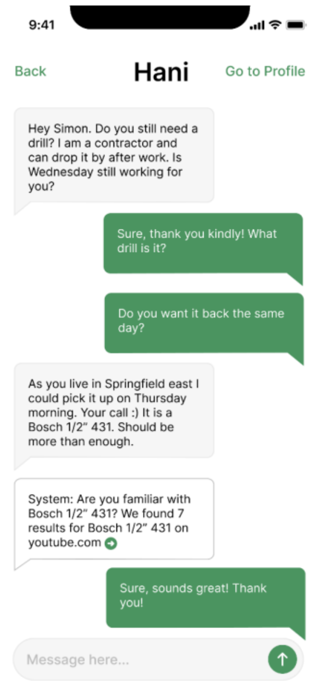


Figure 2. Exemplary screenshot of the instantiated prototype

3.3 Sample

A total of 281 participants were acquired via the crowd working marketplace Amazon Mechanical Turk, whereby we only allowed very high-rated and English-speaking participants as criteria. The experiment was conducted in May 2021. 116 cancelled the experiment without submitting any information and thus were excluded. The 165 remaining participants were randomly assigned to the BP or CARP by the online survey tool LimeSurvey. Three attention checks were included in the survey, which led to the exclusion of 54 participants. Gender, age and sample size of both sample groups are illustrated in table 2.

Table 2. Demographics of participants

	Age	Gender (f/m/o)	N
Sample BP	34,0	19/38/0	57
Sample CARP	34,5	15/39/0	54

Table 3. Descriptive statistics

	$\bar{x}_{BP}$	SD_{BP}	$\bar{x}_{CARP}$	SD_{CARP}	Cronbach's alpha
Competence	4.45	0.47	4,47	0,49	0,89
Autonomy	4.11	0.67	4,61	0,60	0,89
Relatedness	4.17	0.60	4,32	0,64	0,60
Intention to Use	5.51	1.37	6.12	0,77	0,81

Please note that Intention to uses a 7-point Likert scale while Competence, Autonomy and Relatedness use only 5-point Likert scales.

3.4 Procedure

Both groups received the same scenario description and tasks to complete [52]. After reading through the scenario and passing the attention checks

e.g. what kind of items were sold?, the participants were asked to select all features and mechanisms that they recall being included in the app. As intended, the participants were able to identify correctly, whether a feature was implemented or no, thus showing that our manipulation was successful. Throughout the presentation of the scenarios and in the questions, the participants were asked to identify with the user and reflect their experience in the scenario to improve empathy. The survey includes six variables and 18 items. *Competence*, *autonomy*, and *relatedness* have five items each and employ a 5-point Likert scale [12]. *Intention to use* (3 items) uses a 7-point Likert scale [22]. Likert scales were chosen as proposed by the original authors. If necessary, the items were adjusted to the scenario accordingly, e.g. "the EP allows me to…" instead of "the software, etc., allows me to…".

4. Results

To test H1a, H1b, H1c and H2 (see table 4), we carried out our analysis with SPSS. As the two samples (for the BP and CARP) in our experiment are independent, we employ Welch's t-test to compare the results of both samples [53]. While the ordinal character of the Likert scales usually calls for the use of non-parametric statistics, we employed the parametric Welch's test on Likert scales and not the Likert items. Thereby, interval data was produced that is "perfectly appropriate" to analyze parametrically [54]. Table 3 provides an overview of the descriptive statistics.

In order to ensure that the necessary changes on the items have not affected the reliability of the measures we employed, we calculated Cronbach's alpha for all variables. The reliability statistics of all variables are between 0,6 and 0,89, thus, confirming that any smaller alterations of the items to our scenario have not diminished their usefulness in assessing our experiment or replicated by other authors. While the Cronbach's alpha of r*elatedness* is lower than 0,7 yet we will still consider this construct to evaluate our artifact as its reliability qualifies as "satisfactory" and allows for useful interpretations in this context [55].

Table 4. Hypotheses

H1. The CARP will increase the users'…
a. ...perceived *competence*.
b. ...perceived *autonomy*.
c. ...perceived *relatedness*.

H2. The CARP will increase the users' *intention to use.*

Based on our analysis, all variables show very high scores. Comparing the mean scores ($\bar{x}$) against the mean of the scale while accounting standard deviation (SD) still shows significantly positive results for all variables. Although we employed two different Likert scales (5-point for *competence*, *autonomy* and *relatedness* and 7-point for *intention to use*) the mean score is well above "I agree" leaning towards "I strongly agree" for every variable despite the frequent inclusion of reverse coded items to control for response bias [56]. The comparison of the means of the control group evaluating the BP and the second group evaluating the CARP yielded the following results: First off, we need to reject H1a as *competence* had no significant difference between the groups. In fact, *competence* was perceived as almost identical in both groups ($\bar{x}_{CARP}$= 4,47 vs. $\bar{x}_{BP}$= 4,45, t= 0,061, p = 0,805), showing that users of both groups felt similarly "...capable and effective at using the EP".

Compared to the BP participants perceived their *autonomy* as increased ($\bar{x}_{CARP}$=4,61 vs. $\bar{x}_{BP}$=4,11, t= 4,61, p=0,034), therefore H1b is supported by our analysis. H1c, however, cannot be supported as there was no significant difference in *relatedness* between the samples ($\bar{x}_{CARP}$=4,32, $\bar{x}_{BP}$=4,17, t= 1,526, p=0,22). Lastly, the *intention to use* of the CARP sample was significantly higher than in the group with the BP ($\bar{x}_{CARP}$=6,12, $\bar{x}_{BP}$=5,51, t=8,617, p = 0,004). While H1a and H1c were rejected, the measures of perceived *competence* and *relatedness* are still significantly above the mean of the scales thus explaining the high *intention to use* for both prototypes. The implementation of the features, i.e. the manipulation of the basic version to increase *autonomy*, but also *competence* and *relatedness* appears not only successful but also effective in increasing the *intention to use* of users.

Our findings will be discussed and contextualized in the subsequent section.

5. Discussion

Our analysis yielded several interesting results that research and practitioners should consider in their work to foster autonomy, competence and relatedness on digital platforms and especially EPs. Concerning RQ1*: Can specific features increase the perceived self-determination of users on an EP?* we found that the CARP only significantly increases the perceived autonomy of a user, instead of all constructs proposed by SDT. In regards to perceived autonomy, features that allow the users to make their own informed choices and e.g. afford informative feedback [33] seem to have a positive impact on the users' perceived *autonomy* (e.g. 'The EP provides me with useful options and choices.'). This supports findings in prior studies conducted in learning environments [41] and gaming [45], where e.g. the implementation of choices had a positive impact on the perceived autonomy.

However, there is no significant increase in *perceived competence* and *perceived relatedness*. As described in this study, we tried to make the user feel that someone cares about them, for instance, by including a personal human support person [25]. Therefore, we argue that to perceive a very high degree of *relatedness* (e.g. 'The EP helps me to feel part of a larger community.'), actual interaction, e.g. through texting [57] or social networking [58] would be necessary. This cannot be easily simulated via a prototype as the displayed conversations are static and would explain the high but not significantly different results of our experiment. Although it is an essential component of well-being, *relatedness* has been less considered in interface studies because it is not sensible in all technology implementations [12]. Calvo and Peters [59] argued that e.g. in mindfulness apps there is a risk of comparing oneself through social exchange and also revealing less of oneself, which is not beneficial in that context.

In the CARP, we included many user guidance instructions, e.g., to help with onboarding to provide competence support [24]. On the one hand, these implementations that guide new users can promote *competence*, but on the other hand, it can also reduce *autonomy* [60]. Here, for example, the offering of tutorials could be seen as useful and thus promoting *competence*, or as invasive and thus inhibiting *autonomy*. Therefore, it cannot always be clearly predicted to what extent the implemented mechanism supports the intrinsic motivation and thus the well-being of the user. Also, as discussed above, the principle, that proper interaction is difficult to represent via a prototype experiment, is equally valid. In a real EP, you could test and demonstrate your ability to use the current EP by easily navigating through it and achieving your desired outcomes.

While several kinds of instructions and supportive material are presented to the user, the overall interface was not changed. Both prototypes were very realistic and meant to resemble actual EPs that users are familiar with. Although there was no significant difference in perceived *competence* (e.g. 'I feel very capable and effective at using the EP.'), it might undermine the impact of the mechanisms we have employed, but it also shows that the overall user interface was intuitive and well designed in both prototypes, since poor usability can have negative effects on autonomy and competence [12].

We argue that due to this, our other findings are more robust as both the CARP and the BP achieved very high ratings in *competence* as the inability to use the EP would also likely affect autonomous actions and building relationships. Based on the qualitative interviews that were conducted in a prior study and informed the mechanisms, we still assume that more complex EPs and tasks benefit from the mechanisms we proposed.

With respect to RQ2: *Are the implemented features affecting the intention to use the EP?*, we find that *intention to use* increases significantly in the CARP and thus the implemented mechanisms might have a positive impact on long-term engagement. Consequently, our findings may support that long-term engagement is increased by high levels of perceived *autonomy*, *competence* and *relatedness* [12, 44], but must be validated in a subsequent study. Also, Roca and Gagne [21] found in their study about the influence of SDT on *intention to use* in e-learning that *autonomy* and *competence* have a positive effect on continuance. In addition, they found that *relatedness* has a positive impact on perceived playfulness which is also an important intrinsic motivator, which could additionally be evaluated in future studies.

There are several considerations that need to be addressed before drawing generalized results from our study. Our scenario-based approach builds on a hypothetical situation and thus may not reflect the natural behavior of EP users. Only reviewing and imagining the use of an EP could yield different results compared to navigating a real EP, especially in terms of *competence* and *relatedness* [25]. In order to address this shortcoming, the mechanisms could be implemented in existing EPs to conduct a field study, thus, enable users to empathize better with the described scenarios.

Also, while neighborhood community platforms serve as an interesting and inherently suitable context, we assume that the context has especially influenced the perceived *relatedness* of users, as e.g. being part of a community may already suggest a relatedness-oriented environment. Therefore, future research may consider implementing the mechanisms in alternative scenarios or contexts, to confirm a more general applicability of the mechanisms' effects. Also, the neighborhood community environment comes with several implications related to locality and trust [49] that contexts e.g. crowd-working EPs are possibly less affected by.

In addition, we decided to show the user only one prototype at a time. Thus, a direct comparison of the two versions was not possible for the participants, and might have led to different results than a within-design would have. Our sample groups also predominantly reflect the perspective of young and well-educated (81 % have a college or PhD degree) users from a Western culture. Thereby, especially the *competence* variable (i.e. the perceived ability to competently utilize the app) might have received higher scores compared to a sample with more evenly distributed age and level of education. Additional studies, especially in the field, might further enrich our findings.

Further we did not evaluate each feature separately and can therefore only make statements about the entire implemented feature set. Also, in contrast to a study by Sheldon and Filak [25] where they conducted a 3x2 experiment, we did not consider the three constructs separately and thus could only measure the difference between the CARP containing all constructs and the BP prototype. Although Ryan and Deci [33] argue that in order to feel well-being, it is not sufficient to satisfy only a single construct, rather *autonomy, relatedness* and *competence* must be equally present.

Future studies could address the question of whether it is sufficient to implement only one feature of a particular construct or whether it is the entire feature set that increases the users' *intention to use*. Our focus was on developing a prototype that prioritizes user well-being and consequently avoids extrinsic mechanisms (e.g. push notifications). A further study could therefore compare the CARP to a prototype with extrinsic mechanisms to investigate to what extent these mechanisms are perceived by users as inhibiting their well-being.

Based on the insights gained from the performed experiment, practitioners can use the feature e.g. implementation of feedback channels *(autonomy)*, providing user instructions *(competence)* and interaction with users *(relatedness)* to significantly increase a users' intention to use the platform in the future. While in this data set only minor differences in perceived competence, and relatedness between the two prototypes could be observed, our ultimate goal is to provide a set of mechanisms that enables platform operators to design an EP, that is both successful and considers user needs, ideally increasing user well-being.

6. Conclusion

We derived four hypotheses from literature and tested them with an online experiment where we altered the features of an EP prototype to increase the user's perceived autonomy, competence, and relatedness. While we were not able to show an improvement for competence and relatedness, the perceived autonomy and intention to use were significantly increased by the manipulations informed by the 13 mechanisms derived in prior studies. These results partially support that the proposed set of mechanisms is effective. Additionally, perceived competence and relatedness were rated very highly for both prototypes, with only marginally better scores for the manipulated prototype. A between-design does not afford users with a direct comparison between two prototypes. Therefore, future studies may employ a within- or 3x2-design to allow for a more accurate evaluation of the respective variables. While we were not able to confirm the positive effect of our manipulations for competence and relatedness, the high approval rating may still provide practical insights in how to improve self-determined user experiences on EPs.

Our findings contribute to the existing body of knowledge by describing 13 mechanisms to foster self-determined user experiences. These findings and their evaluation may also be applied by practitioners to improve existing or create new EPs that foster engagement through intrinsic rather than extrinsic motivation.

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